Supervised Machine Learning: Regression and Classification

by DeepLearning.AI & Stanford University

About this Course
In the first course of the Machine Learning Specialization, you will:
• Build machine learning models in Python using popular machine learning libraries NumPy and scikit-learn.
• Build and train supervised machine learning models for prediction and binary classification tasks, including linear regression and logistic regression

The Machine Learning Specialization is a foundational online program created in collaboration between DeepLearning.AI and Stanford Online. In this beginner-friendly program, you will learn the fundamentals of machine learning and how to use these techniques to build real-world AI applications.

This Specialization is taught by Andrew Ng, an AI visionary who has led critical research at Stanford University and groundbreaking work at Google Brain, Baidu, and Landing.AI to advance the AI field.

This 3-course Specialization is an updated and expanded version of Andrew's pioneering Machine Learning course, rated 4.9 out of 5 and taken by over 4.8 million learners since it launched in 2012.

It provides a broad introduction to modern machine learning, including supervised learning (multiple linear regression, logistic regression, neural networks, and decision trees), unsupervised learning (clustering, dimensionality reduction, recommender systems), and some of the best practices used in Silicon Valley for artificial intelligence and machine learning innovation (evaluating and tuning models, taking a data-centric approach to improving performance, and more.)

By the end of this Specialization, you will have mastered key concepts and gained the practical know-how to quickly and powerfully apply machine learning to challenging real-world problems. If you're looking to break into AI or build a career in machine learning, the new Machine Learning Specialization is the best place to start.

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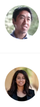
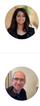


Taught by: **Andrew Ng**, Instructor
Founder, DeepLearning.AI & Co-founder, Coursera



Taught by: **Aarti Bagul**, Curriculum Engineer

Taught by: **Geoff Ladwig**, Curriculum Engineer
DeepLearning.AI

Basic Info	Course 1 of 3 in the Machine Learning Specialization
Level	Beginner
Commitment	At the rate of 5 hours a week, it typically takes 3 weeks to complete this course.
Language	English, **Subtitles:** Arabic, French, Bengali, Ukrainian, Chinese (Simplified), Greek, Italian, Portuguese (Brazil), Dutch, Korean, German, Pashto, Urdu, Russian, Thai, Indonesian, Swedish, Turkish, Azerbaijani, Spanish, Dari, Hindi, Japanese, Kazakh, Hungarian, Polish
How To Pass	Pass all graded assignments to complete the course.
User Ratings	Average User Rating 4.9

Syllabus

Week 1

Week 1: Introduction to Machine Learning

Welcome to the Machine Learning Specialization! You're joining millions of others who have taken either this or the original course, which led to the founding of Coursera, and has helped millions of other learners, like you, take a look at the exciting world of machine learning!

20 videos, 1 reading

1. **Video:** Welcome to machine learning!
2. **Video:** Applications of machine learning
3. **App Item:** Intake Survey
4. **Reading:** [IMPORTANT] Have questions, issues or ideas? Join our Forum!
5. **Video:** What is machine learning?
6. **Video:** Supervised learning part 1
7. **Video:** Supervised learning part 2
8. **Video:** Unsupervised learning part 1
9. **Video:** Unsupervised learning part 2
10. **Video:** Jupyter Notebooks
11. **Ungraded Lab:** Python and Jupyter Notebooks
12. **Video:** Linear regression model part 1
13. **Video:** Linear regression model part 2
14. **Ungraded Lab:** Optional lab: Model representation
15. **Video:** Cost function formula
16. **Video:** Cost function intuition
17. **Video:** Visualizing the cost function
18. **Video:** Visualization examples
19. **Ungraded Lab:** Optional lab: Cost function
20. **Video:** Gradient descent
21. **Video:** Implementing gradient descent
22. **Video:** Gradient descent intuition
23. **Video:** Learning rate
24. **Video:** Gradient descent for linear regression
25. **Video:** Running gradient descent
26. **Ungraded Lab:** Optional lab: Gradient descent

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Graded: Practice quiz: Supervised vs unsupervised learning

Graded: Practice quiz: Regression

Graded: Practice quiz: Train the model with gradient descent

Week 2

Week 2: Regression with multiple input variables

This week, you'll extend linear regression to handle multiple input features. You'll also learn some methods for improving your model's training and performance, such as vectorization, feature scaling, feature engineering and polynomial regression. At the end of the week, you'll get to practice implementing linear regression in code.

10 videos

1. **Video:** Multiple features
2. **Video:** Vectorization part 1
3. **Video:** Vectorization part 2
4. **Ungraded Lab:** Optional lab: Python, NumPy and vectorization
5. **Video:** Gradient descent for multiple linear regression
6. **Ungraded Lab:** Optional Lab: Multiple linear regression
7. **Video:** Feature scaling part 1
8. **Video:** Feature scaling part 2
9. **Video:** Checking gradient descent for convergence
10. **Video:** Choosing the learning rate
11. **Ungraded Lab:** Optional Lab: Feature scaling and learning rate
12. **Video:** Feature engineering
13. **Video:** Polynomial regression
14. **Ungraded Lab:** Optional lab: Feature engineering and Polynomial regression
15. **Ungraded Lab:** Optional lab: Linear regression with scikit-learn

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Graded: Practice quiz: Multiple linear regression

Graded: Practice quiz: Gradient descent in practice

Graded: Week 2 practice lab: Linear regression

Week 3

Week 3: Classification

This week, you'll learn the other type of supervised learning, classification. You'll learn how to predict categories using the logistic regression model. You'll learn about the problem of overfitting, and how to handle this problem with a method called regularization. You'll get to practice implementing logistic regression with regularization at the end of this week!

12 videos, 2 readings

1. **Video:** Motivations
2. **Ungraded Lab:** Optional lab: Classification
3. **Video:** Logistic regression
4. **Ungraded Lab:** Optional lab: Sigmoid function and logistic regression
5. **Video:** Decision boundary
6. **Ungraded Lab:** Optional lab: Decision boundary
7. **Video:** Cost function for logistic regression
8. **Ungraded Lab:** Optional lab: Logistic loss
9. **Video:** Simplified Cost Function for Logistic Regression
10. **Ungraded Lab:** Optional lab: Cost function for logistic regression
11. **Video:** Gradient Descent Implementation
12. **Ungraded Lab:** Optional lab: Gradient descent for logistic regression
13. **Ungraded Lab:** Optional lab: Logistic regression with scikit-learn
14. **Video:** The problem of overfitting
15. **Video:** Addressing overfitting
16. **Ungraded Lab:** Optional lab: Overfitting
17. **Video:** Cost function with regularization
18. **Video:** Regularized linear regression
19. **Video:** Regularized logistic regression
20. **Ungraded Lab:** Optional lab: Regularization
21. **Reading:** [IMPORTANT] Reminder about end of access to Lab Notebooks
22. **Video:** Andrew Ng and Fei-Fei Li on Human-Centered AI
23. **Reading:** Acknowledgments

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Graded: Practice quiz: Classification with logistic regression

Graded: Practice quiz: Cost function for logistic regression

Graded: Practice quiz: Gradient descent for logistic regression

Graded: Practice quiz: The problem of overfitting

Graded: Week 3 practice lab: logistic regression

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How It Works

General

How do I pass?

To earn your Certificate, you'll need to earn a passing

More

Programming assignments

Programming assignments require you to write and run a computer program to solve a problem.

More

Course 1 of Specialization

#BreakIntoAI with Machine Learning Specialization
Master fundamental AI concepts and develop practical machine learning skills in the beginner-friendly, 3-course program by AI visionary Andrew Ng

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DeepLearning.AI, Stanford University

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